CLEAN AIR ACT SECTION 112(r) INSPECTION REPORT

Twin Lake Chemical, Inc.

Lockport, NY

GENERAL INFORMATION

Stationary Source	Twin Lake Chemical, Inc.
Date of Inspection	June 6 & 7, 2012
USEPA Inspector	Ellen Banner – USEPA, REGION II (Edison, NJ) Dwayne Harrington – USEPA, REGION II (Edison, NJ)
Contract Auditor	Neil Mulvey, OHC (Subcontractor)
Description of Activities	• Opening meeting with facility representative. • Program audit. • Closing meeting with facility representatives. Program audit consisted of the following activities: 1. Document review. 2. Field verification. 3. Personnel interviews

STATIONARY SOURCE INFORMATION

EPA Facility ID #	1000 0008 1957
Date of Latest Submission (used for RMP inspection)	Receipt Date: May 14, 2009 (Re-submission) Anniversary Date: May 14, 2014
Facility Location	520 Mill Road PO Box 411 Lockport, NY 14094 Niagara County Tel. (716) 433-3824
Number of Employees	*RMP*Submit* states 16 employees (per RMP registration) At time of inspection, facility reported 10 employees. Non-Union workforce.

Description of Surrounding Area	The facility, which is located on < 7 acres, is situated in a small industrialized neighborhood surrounded by rural / residential areas. The facility is bordered to the north by Mill Street and open space; to the south the facility is bordered by Eighteen Mile Creek and open space; to the east the facility is bordered by VanDeMark Chemical (an RMP registered facility); to the west the facility is bordered by an industrial operation and open space. The nearest resident is located approximately 800-feet to the NE from the main manufacturing area.
Participants	Participants included: Ellen Banner, USEPA – Region II, Edison, NJ Dwayne Harrington, USEPA – Region II, Edison, NJ Neil Mulvey, USEPA Contractor Twin Lake Chemical, Inc. William T. Caswell – Plant Manager+ James D. Hodan, President* * Assigned RMP Manager + Lead during facility tours

REGISTRATION INFORMATION

Process ID #	1000001839 - Organic Acids Manufacture
Program Level (as reported in RMP)	Program 3
Process Chemicals	Phosgene (Carbonic dichloride) @ 32,000-lbs. (CAS No. 75-44-5)
NAICS Code	325199 (All Other Basic Organic Chemical Manufacturing)

Process ID #	1000001840 - PCl5 Manufacturing
Program Level (as reported in RMP)	Program 3
Process Chemicals	Chlorine @ 4,000-lbs. (CAS No. 7782-50-5) Phosphorous trichloride (Phosphorous trichloride) @ 46,000-lbs. (CAS No. 7719-12-2)
NAICS Code	325188 (All Other Basic Inorganic Chemical Manufacturing)

GENERAL COMMENTS

Registration Quantities

While the current RMP registration lists phosgene, chlorine, and phosphorous trichloride at quantities above the regulated threshold amounts, facility management reported that chlorine and phosphorous trichloride are no longer on site in quantities above the regulated threshold amounts (i.e. thresholds of 2,500-lbs. for chlorine and 15,000-lbs. for phosphorous trichloride). Facility management explained that the phosphorus pentachloride manufacturing process, which utilizes chlorine and phosphorous trichloride, now operates as a small, part-time batch process (e.g., producing approximately 2,000 – 4,000-lbs./yr).

An EPA inspector reviewed material invoices and receipt documentation and confirmed that on-site inventories of chlorine and phosphorous trichloride were in fact less than the regulated thresholds. During the facility tour two 1-ton chlorine containers were observed in Building 2. Facility management explained that one cylinder is full and the second cylinder is a spare (containing an estimated 150-lbs.). Three drums of phosphorous trichloride were observed on-site (estimated total of 1,980-lbs.) in Building 2. Facility management explained that the 4,200-gals. phosphorous trichloride bulk storage tank is out-of-service. The facility plans to de-register chlorine and phosphorous trichloride.

OSHA Process Safety Management

While the facility's on-site inventory of chlorine is below the RMP threshold quantity of 2,500-lbs., the facility is still likely subject to OSHA's Process Safety Management (PSM) regulation (29 CFR §1910.119) since chlorine remains on-site above the PSM threshold quantity for chlorine of 1,500-lbs. Similarly, the facility handles thionyl chloride, which is not a regulated substance under the USEPA RMP rule, but does have a 250-lbs. threshold quantity under OSHA's PSM regulation.

NOTES:

1. **The initial USEPA RMP inspection of this facility was conducted on July 16, 2003 and is the subject of a separate report.**

2. **Since chlorine and phosphorus trichloride are on-site in quantities below the RMP threshold, this RMP inspection focused on the regulated process handling phosgene (i.e., organic acid manufacturing / phosgenation process).**

3. **Several of the RMP programs were reviewed by the USEPA inspectors are duly noted in this report.**

Organic Acid Manufacturing/Phosgenation Process

The phosgenation process utilizes phosgene to product organic acid chlorides. Phosgene is supplied to the process via 1-ton containers. Phosgene is purchased from VanDeMark Chemicals located immediately adjacent to Twin Lake. Phosgene containers are stored in a cinder-block wall constructed building (Building 4). At the time of this inspection, the phosgene inventory in Building 4 included: 10 full 1-ton containers (five in storage + five on scales connected for use) and five empty containers. The total phosgene inventory therefore totaled 20,000-lbs., less than the registered quantity of 32,000-lbs.).

Facility management reported that the manufacturing process uses approximately six to eight 1-ton containers (i.e., 12,000-lbs. – 16,000-lbs.) every 7 – 14 days.

Building 4 contains five scales used to measure phosgene flow to the process. When configured for feeding phosgene to the process, each container has two connections: one for phosgene liquid feed (bottom connection) and one for compressed air feed to the cylinder (to connection). Compressed air is used to transfer liquid phosgene from the container through distribution lines to reactors. Each scale is dedicated to a reactor; there are two reactors in Building 1 and three reactors in Building 2. Phosgene distribution lines exit Building 4 and run along the south exterior wall of Building 2 before entering at a reactor area; in order to supply reactors in Building 1 the phosgene distribution lines run along an overhead pipe-rack across an internal road / yard to enter Building 1.

Five different products are produced using phosgene, including:

- Terephthaloyl chloride (TPC)
- Isophthaloyl chloride (IPC)
- Orthophthalolyl chloride (OPC)
- Trimellitic trichloride (TMTC)
- Hexanoyl chloride (Hex)

Manufacturing is a batch process with batch-cycle times ranging from 1 – 4 days. The phosgenation process includes five reactors. A reactor system includes the reactor (1,000-gals.), distillation, recovery, and storage. Phosgene is fed to the reactors at a rate of approximately 100-lbs/hour. Phosgene feed to the reactors is over a 24 – 36-hour period, depending on batch requirements.

The facility typically operates Monday – Friday, 24/7. Manufacturing personnel include the Plant Manager, two Foreman, and three Operators. A typical shift includes one Foreman and one Operator. Equipment and facility maintenance is performed by one of the Foreman. The Plant Manager explained that the dedicated position of Maintenance Supervisor was eliminated a few years ago. The most recent hire was approximately four years ago (new Operator).

There are five phosgene detectors on-site: one in the phosgene container room (Building 4) and four located outside serving as perimeter monitors. The perimeter monitors are set to alarm at 0.5 PPM while the detector inside Building 4 is set to alarm at 3.0 PPM. At the set-point an alarm will sound locally and at an off-site 24/7 monitoring center (Amherst Alarm). Amherst Alarm has a call-down list to notify Twin Lake employees in the event of an alarm.

The process includes an emergency scrubber designed to exhaust and scrub air from the phosgene container room (Bldg. 4) in the event of a phosgene release inside the room.

RMP DOCUMENTATION

The facility maintains several binders containing RMP documentation. RMP program documentation was developed entirely internally and is implemented entirely internally. Facility management demonstrated an understanding and appreciation for the intent of RMP.

Management System [*40 CFR 68.15*] & Registration

James D. Hodan, Vice President of Manufacturing, is responsible for RMP program implementation. Bill Caswell, Chemical Engineer, has delegated responsibility for specific RMP elements.

Hazard Assessment [*40 CFR 68.22*]

The nearest public receptor is approximately 0.1 miles from the facility. The facility used EPA Guidance Tables for phosgene for their Worst- and Alternative–case OCAs.

The facility did not provide documentation for their Off-site Consequences Analysis (OCA) calculations.

- The facility did not perform a five-year update of their OCA.

Process Safety Information (PSI) [*40 CFR 68.65*]

The facility has a brief written policy regarding PSI that was last reviewed on 4/16/10 and scheduled for re-review on 4/16/13.

Block-flow diagrams (BFDs) and piping-and-instrumentation diagrams (P&IDs) are organized by product (i.e., drawings for each product that utilizes phosgene as a raw material). While P&IDs do exist for each reactor system using phosgene, the drawings have the following deficiencies:

- No indication of pipe size
- No indication on the use of flex hoses (where used)

- Missing shut-off valves in distribution lines
- Missing reactor manways and sightglasses
- Missing reactor / vessel access ports
- Incorrect identification of instruments

The format and content of the P&IDs is non-traditional and inconsistent with industry standards (such as International Society of Automation (ISA)). The Plant Manager did explain that a project is underway to develop updated equipment based P&IDs.

Available PSI included:

- Phosgene MSDS
- Process chemistry
- Equipment specifications
- Safe upper and lower operating limits
- Material inventories
- Description of safety systems (contained in SOPs)

The description of consequences of deviating from safe upper and lower operating limits appear to focus primarily on product quality, efficiency, and yield, rather than process safety implications. For example, thermal decomposition can lead to a release of toxic / corrosive gases and vapors (CO and chlorine gas).

Information on material inventories is incorrect because it still shows chlorine on-site at 6,400-lbs. and PCl3 at 42,000-lbs. Also, the maximum inventory for phosgene is listed at 46,000-lbs. when the registered quantity is 32,000-lbs.

PSI documentation includes a statement signed (on 6/4/12) by the Plant Manager and President that the facility adheres to RAGAGEP. The evaluation does not include a reference to engineering codes or standards or description of how existing equipment is designed and operated consistent with industry codes and standards. For example, emergency shutdown procedures requires the operator to manually close valves at the phosgene container or in the distribution lines. All of the shutoff valves are manual. In the event of an emergency, operators may not have access to manual shutoff valves in the phosgene delivery system.

Available PSI did not include:

- Description of electrical classification
- Ventilation system design (particularly for the phosgene container storage room emergency ventilation system)

Process Hazard Analysis (PHA) [*40 CFR 68.67*]

The following reports of PHA were available on-site for review:

- Records and notes of a PHA completed in 1999
- "PHA Tables" completed in 1999 for five process areas
- November/December 2003 PHA
- December 2008 PHA Revalidation

The report of the 7/16/03 RMP inspection provided the following findings and recommendations regarding the 1999 PHA documentation:

> *The facility has completed an initial PHA study and a PHA revalidation in May 1999. The PHA studies are not consistent with regulatory standards in that they do not address all of the potential hazards in the process and do not follow the prescribed PHA methodology.* ***The facility should complete a PHA study of all covered processes in accordance with the PHA regulatory requirements. The PHA study team leader should be trained and experienced in performing PHA studies. The facility should develop a management system for tracking the timely resolution of PHA study recommendations.***

PHA team members for the December 2008 PHA Revalidation included:

- William Caswell, Chemical Engineer
- James D. Hodan, VP of Manufacturing

- There was no operator participation on the 2008 PHA study team.

- PHA study documentation did not include information to determine if the PHA team included someone with knowledge in the specific PHA methodology being used.

The 2003 PHA utilized the HAZOP PHA study method. The 2008 PHA was a review of the 2003 PHA since, as stated in the 2008 PHA report, *" .... the quality of the first two PHA's are exceptional and make it unnecessary to redo or start from scratch."* It is noted that the 7/16/03 RMP inspection concluded that the 1999 PHA was inadequate.

Industry standard for conducting PHAs, particularly HAZOPs, which is the method used for the 2003 and 2008 PHA, is to organize the process into study nodes, and focus the team evaluation on one node at a time. The study node list for the 2003 and 2008 PHAs are identical. The following table presents a comparison of the study node list established by Twin Lake Chemical in their PHA, and a more detailed node list.

Process 1: Acid Chloride Production with Phosgene	
Twin Lake Chemical Node List	**More Detailed Node List**
1. Phosgene Flow from Cylinders and Vacuum to Phos Line	1. Receipt and Off-load of Phosgene Cylinders and Movement to Storage
2. Air to Phosgene Cylinder	2. Connect / Disconnect of Phosgene Cylinders
3. Caustic scrubber recirculation	3. Phosgene Transfer to Reactor
4. Initial Start-up	4. Reactor / Reaction

5. Normal Operation	5. Reactor Off-gas to Caustic Scrubber
	6. Batch Transfer from Reactor to Still
	7. Still
	8. Receiver
	9. Transfer to Drums
	10. Transfer to Bulk Tank
	11. Human Factors
	12. Facility Siting
	13. Global

Typically, the more detailed the node list, the more detailed the study. As shown in the above tables, important aspects of Process 1 may not have been adequately studied since they were not specified as study nodes.

The facility siting analysis included in the 2003 and 2008 PHAs is simply a description of the surrounding area and a description of area monitors. There is no analysis of the affects of a regulated material release on surrounding areas or the impact surrounding activities can have on the regulated process, nor consideration of release impact on control room or other areas where employees may congregate.

Human factors appears to have been properly evaluated under nodes 4 and 5 of Process 1 (phosgene process), but not for the other nodes.

The 2003 and 2008 PHA studies did not identify any recommendations.

Standard Operating Procedures (SOPs) [*40 CFR 68.69*]

The facility has written SOP describing step-by-step procedures covering the following operating phases:

- Initial start-up
- Normal operation
- Temporary operations
- Emergency shutdown
- Emergency operations
- Normal shutdown
- Startup after emergency shutdown

The SOPs also include a description of safe operating limits and safety and health considerations. SOPs are written for each major product produced.

There are also written procedures for "Phosgene Handling and Delivery" which are contained in each product specific SOP.

During the facility tour, the Plant Manager explained that the emergency scrubber for Building 4 (phosgene container room) is turned ON during cylinder connection/disconnection; the "Phosgene Handling and Delivery" SOP does not include this step in start-up.

Step 12 (Initial Start-up) in the "Phosgene Handling and Delivery" SOP states that there are two valves in the phosgene line between the cylinder and the flow meter, when in fact there is only one valve.

Emergency shutdown procedures requires the operator to manually close valves at the phosgene container or in the distribution lines. All of the shutoff valves are manual.

The only date on the SOPs is on the cover page, which lists April 2012. Annual certification of the procedures is documented by a general statement that the procedures were *" ... reviewed in April 2012 by management of TLC."*

Training [*40 CFR 68.71*]

The RMP program includes a written policy regarding operator training; last reviewed on 4/16/10 (with a scheduled review date of 4/16/13). Most recent refresher training was provided on 2/14/12. Documentation includes date of training, description of training provided, and signatures of employee and trainer. Previous refresher training was provided on 7/14/10. Training documentation also includes certification signed by employee and trainer, listing specific SOPs reviewed, and statement by the trainer that employees understood training provided.

Mechanical Integrity [*40 CFR 68.73*]

The RMP program includes a written policy regarding mechanical integrity; last reviewed on 4/21/10 (with a scheduled review date of April 2013).

The MI Program classifies equipment and instruments into "first line of defense" and "second line of defense." First line of defense includes:

- Pressure vessels
- Process piping and components
- Relief and vent systems
- Interlocks
- Temperature instruments
- Pressure instruments

The second line of defense includes:

- Dikes
- Emergency scrubber systems

The MI program includes:

- Description of equipment and instrument inspection and test frequencies
- Description of inspection / test procedures
- Description of training for maintenance personnel
- Description of acceptable test criteria
- Description of inspection and test documentation
- Quality assurance

A review of MI records and documentation identified the following findings:

- Records of monthly visual inspection of phosgene cylinder chain hoist, performed in 2012, 2011, and 2010 available for review; includes inspection of cylinder hooks, condition of chain, and overall hoist operation. There was no record indicating that the hoist inspection program complies with RAGAGEP, such as ASME/ANSI consensus standard B30.16 for overhead hoists. Additionally, the phosgene hoist is not included on the list of equipment included in the inspection and test program.
- The MI program equipment list includes equipment no longer in service, such as the phosphorus trichloride storage tank and associated piping.
- The program states that basis for inspection and test frequency is based on company experience due to the lack of manufacturers' recommendations. In fact, there are existing ASME and ANSI standards applicable to pressure vessels, process piping, relief systems, and pumps.
- No records available of thickness tests on pressure vessels (i.e. reactors) or phosgene transfer piping (such as non-destructive examination (NDE) wall thickness tests); the MI program does state that process piping will be measured for wall thickness but no records were available for review.
- Records of completed inspections and tests include only the date of the inspection/test, but do not include identification of who performed the inspection / test or the results of the inspection / test.
- All equipment and instrument inspection and tests are performed internally, with no evaluation performed by outside experts (such as hoist inspection, vessel inspections, pipe inspections).
- The MI Program does not include a description of how maintenance materials and spare parts are managed to ensure that they are suitable for intended service.

Management of Change (MOC) [*40 CFR 68.75*] & Pre-Startup Review (PSR) [*40 CFR 68.77*]

The RMP program includes a written policy regarding management of change and pre-startup safety review; last reviewed on 4/21/10 and 4/16/10 respectively (with scheduled review dates in April 2013).

The MOC and PSR procedures as written address the RMP requirements. The procedures include a MOC form for documentation and authorization.

Completed MOCs on file include: 10/7/03, 12/15/03, 12/22/03, 3/24/03, 7/8/04, 5/6/05, 10/17/05, 2/06, 7/8/04, 11/19/08, and 6/6/11. A review of MOCs dated 5/6/05, 10/17/05 and 2/06 identified the following deficiencies:

- The 2/06 MOC addressed the addition of a second pH controller to the phosgene scrubber; documentation indicated that there was no need to update the P&ID to show this new instrument.
- The 5/6/05 MOC addressed the addition of a 4" Teflon plug valve to the phosgene reactors; documentation indicated that there was no need to update the P&ID to show this new plug valve.
- The 10/17/05 MOC addressed modifications to the phosgene cylinder vent location; documentation indicated that there was no need to update the P&ID to show this new vent location.
- In all three of the above listed MOCs, the safety and health review indicated that these changes were a 'safety improvement' but did not consider the safety and health implications of the change.
- In all three of the above listed MOCs, the PSR review was either not performed or consisted of a 'line inspection' but no other documentation.

Compliance Audits [*40 CFR 68.79*]

Reviewed by USEPA.

The facility performed RMP compliance Audits in 2006, 2009, and 2012. The 2012 audit was performed by William Caswell, and resulted in the following findings:

  - Need to review the ER plan
  - MSDSs adequate for PSI
  - PSI Consequences of Deviation: assessed "severity of consequences"; unspecified
  - Determined that P&IDs could be more detailed and the need to update the electrical classification, relief design systems, ventilation design, and standards and codes employed
  - Operator training is adequate (classroom and OTJ)
  - SOPs need to be reviewed

- There is no system to track the status of audit findings, and many of the findings in Twin Lake Chemical's RMP audits did not result in specified corrections.

- Most of the findings of EPA's RMP inspection were not identified during Twin Lake Chemical's RMP audits.

Incident Investigation [*40 CFR 68.81*]

Reviewed by USEPA.

The facility has incident investigation procedures, and provided the following incident reports for review:

- 4/25/06 (DEC Spill #0600925): Nozzle plugging caused the scrubber to lose efficiency, resulting in an estimated the release of < 10 lbs phosgene for ~ 5 mins. The facility discussed several possible scenarios which could have caused phosgene to be released from the scrubber column. Measures were taken to prevent future incidents – not specified.

- 9-1-05 (DEC# - #0506759): 3 lb isophthaloyl chloride spill from a bulk container with a small hole caused by corrosion in the tank. Recommendation – the tank will no longer be used as a bulk shipping container, and Twin Lake will no longer use its own bulk tanks for shipping.

- 8-15-02: While unloading a thionyl chloride truck into the bulk storage area, the transfer hose developed a leak, causing about 1 gallon (13 pounds) of SOcl2 to leak. Decided to use steel line instead of rubber hose.

- Oct. 24, 1994 – flexible line on the thionyl chloride feed line broke while thionyl chloride was being fed to the reactor. 240 pounds of thionyl chloride were released due to failure of the flexible line in the reactor feed line.

Employee Participation [*40 CFR 68.83*]

The RMP program includes a written policy regarding employee participation; last reviewed on 4/16/10 (with a scheduled review date of 4/16/13). Documentation of employee participation includes notes from quarterly safety meetings held in 2006 – 2012; records include date of meeting, employees present, subject of meeting, findings and facts. Reviewed notes from safety meetings held on 4/25/12, 1/19/12, 10/12/11, 7/12/11, 3/29/11, 12/7/10, 6/15/10, and 3/23/10. Topics reviewed during safety meetings include:

- Drumming acid chloride
- Proper use of air stripper
- Hazard communication
- Unloading TPC bulk trucks
- Lab safety
- Power failure drill
- Thionyl scrubber
- Proper use of Bldg. 1 Venturi

- There was no operator participation during the 2008 PHA revalidation.

Hot Work Permit [*40 CFR 68.85*]

The RMP program includes a written policy regarding hot work; last reviewed on 4/21/10 (with a scheduled review date of April 2013). A hot work permit (HWP) is completed as documentation and authorization of hot work. There were no completed HWP forms available for review.

Contractor Safety [*40 CFR 68.87*]

The RMP program includes a written policy regarding procedures for contractor safety; last reviewed on 4/16/10 (with a scheduled review date of April 4/16/13). Contractor procedures include steps for contractor selection based on safety performance and contractor orientation, but does not include procedures for conducting performance evaluations of contractor work while on-site.

There were no contractor records available for review.

- Facility management reported that they do not use contractors to work on RMP-covered equipment, however, their contractor procedure states that contractors only work on equipment when it is shut down. All areas of the facility represent a potential hazard due to the facility's phosgene operations, therefore, contractor safety procedures are required for anyone entering the facility regardless of whether they perform work directly or indirectly on the covered process.

Emergency Response [*40 CFR 68.90 – 68.95*]

Reviewed by EPA.

Emergency Response Plan:

- The facility maintains an internal hazmat response team for chemical emergencies. The facility provided a general facility response plan, including emergency notification and oil spill response procedures. The response plan, however, does not include specific hazmat response procedures (including for phosgene releases), personal protective equipment, hazard assessment, decontamination, first aid, etc. The emergency response plan does not include a hazmat team members list or defined roles and responsibilities. James Hodan, President, is listed as Incident Commander in the event of a chemical emergency.

- The facility stated that the local emergency services maintains a response plan for the facility, however, follow–up by EPA determined that neither the Niagara County LEPC or Lockport emergency services have a specific communications or response plan for the facility.

- Other than dialing 911, the facility does not have a means for immediate community notification in the event of a chemical emergency.

The facility provided copies of their most recent EPCRA Tier II submission to the local LEPC.

Equipment:

The facility has three Self-Contained Breathing Apparatus (SCBA) units, and provided current SCBA inspection records for review.

- The facility provided respirator qualitative fit-testing testing records for their employees. Respirator fit-testing is performed at the facility by Bill Caswell. However, they do not perform quantitative fit-testing as per regulatory requirements.

- The facility maintains air-purifying respirators (APRs) with chemical cartridges for use in response to chemical emergencies, including phosgene releases, however, the cartridges are not rated for phosgene, and there are no phosgene cartridges available commercially (or non-commercially). NIOSH specifies only supplied air breathing apparatus (Level B) for phosgene response.

- The facility's emergency response chemical protective suits (Dupont Tychem QC) are not rated for phosgene.

- The facility has one handheld phosgene monitor (w/ electrochemical sensor), however, the monitor was not functional at the time of the inspection and appeared not to have been so for some time. There were no calibration or maintenance records for the unit.

  Detection of phosgene via a photoionization requires a specialized (11.7 eV) lamp typically not immediately available to first responders. There is no listed response factor for phosgene for flame ionization detectors. The lack of a functional handheld phosgene detector at the facility, and the inability of the most commonly deployed air survey instruments to detect phosgene would presume that, in the event of a phosgene release at the facility, there is potentially currently no reliable means immediately available on- or off-site to identify the specific source and/or off-site impact of the release. Neither the Niagara County LEPC nor Lockport emergency services have a specific response plan for the facility.

Training:

- The facility provided records for employee OSHA HazCom training, however, they do not provide initial 40-hour and/or annual 8-hour HAZWOPER refresher training for their hazmat response team members.

The facility does not provide medical monitoring for their hazmat team members.

FACILITY TOUR

Several items noted during the facility tour include:

- Several areas were observed where phosgene lines were inadequately supported or missing supports
- Routing of phosgene lines below step at man-door exiting Bldg. 4 are vulnerable to being kicked or otherwise struck when moving through the doorway.
- Evidence of external corrosion was observed on a phosgene vent line exiting Bldg. 4.
- The nameplate on the IPC reactor was not legible, as required by ASME Pressure Vessel Code (which requires that pressure vessels be conspicuously labeled).
- The phosgene detector in Bldg. 4 (phosgene room) is located on the E wall of the room (near the stored cylinders) rather than on the W wall near the cylinders in use (where the leak potential is greater).
- All shutoff valves in the phosgene distribution system are manual. In the event of a phosgene release that would prohibit access to manual valves, the facility would likely experience difficulty quickly isolating a phosgene release.
- The facility has established procedures to perform daily tests of the breathing air supply system reportedly used to supply breathing air for operators when connecting / disconnecting phosgene cylinders. Facility management stated that the last 'daily' test of the breathing air system was performed on 8/10/11. The facility did not determine that the breathing air supply system was in a properly vented area.
- During an employee interview, an employee explained that operators may not wear breathing air supply apparatus (required when connecting / disconnecting phosgene cylinders) during the Summer months due to high ambient temperatures and discomfort. There is no emergency egress bottle on the supplied air respirator.
- The reactors, stills, and receivers used in the phosgenation process are not equipped with pressure relief systems.
- While all phosgene lines (vapor and liquid) are painted yellow for identification purposes, the lines are not labeled as "phosgene" lines, creating the potential for misidentification of lack of awareness from outside responders.
- A 'stop' is missing on one side of the stored row of phosgene cylinders.

- Facility management reported that the flex hoses used to transport phosgene from the 1-ton cylinders to fixed transfer piping are visually inspected weekly and changed as necessary. This practice is not noted in the facility MI program. (It is also noted that a flex hose failure on a similarly designed phosgene distribution system operated at the DuPont, Belle, WV facility ruptured releasing an estimated 2-lbs. of phosgene and resulting in a worker fatality (incident date 1/23/10). The US Chemical Safety Board conducted an investigation and issued a detailed incident report. Among several findings, the CSB reported that the suitable material of construction for flex hoses in phosgene service is Monel, rather than Teflon-lined stainless steel hoses.)

FINDINGS/RECOMMENDATIONS

Hazard Assessment [*40 CFR 68.20-42*]

- The facility did not perform a five-year update of their OCA. **The facility must perform a five-year update of their OCA as required by 40 CFR 68.36(a)**.

Process Safety Information (PSI) [*40 CFR 68.65*]

- Several areas were observed where phosgene lines were inadequately supported or missing supports. **The facility must ensure that all phosgene equipment, including transfer line are properly supported, as required by 40 CFR 68.65(d)(2).**

- Routing of phosgene lines below step at man-door exiting Bldg. 4 are vulnerable to being kicked or otherwise struck when moving through the doorway. **The facility must ensure that phosgene equipment, including transfer lines, are protected from inadvertent contact, as required by 40 CFR 68.65(d)(2).**

- Evidence of external corrosion was observed on a phosgene vent line exiting Bldg. 4. **The facility must ensure that phosgene equipment, including transfer lines, are properly protected from corrosion and subsequent line integrity concerns, as required by 40 CFR 68.65(d)(2).**

- The nameplate on the IPC reactor was not legible, as required by ASME Pressure Vessel Code (which requires that pressure vessels be conspicuously labeled). **The facility must ensure that all vessels and reactors contain legible, complete nameplates, as required by 40 CFR 68.65(d)(2).**

- The phosgene detector in Bldg. 4 (phosgene room) is located on the E wall of the room (near the stored cylinders) rather than on the W wall near the cylinders in use (where the leak potential is greater). **The facility must confirm with the phosgene detector manufacturer that the existing location is adequate, as required by 40 CFR 68.65(d)(2).**

- All shutoff valves in the phosgene distribution system are manual. In the event of a phosgene release that would prohibit access to manual valves, the facility would likely experience difficulty quickly isolating a phosgene release. **The facility must evaluate the feasibility and benefits of installing automated shutoff valves in the phosgene distribution system so that a leak can be quickly and safely isolated, as required by 40 CFR 68.65(d)(2).**

- The facility has established procedures to perform daily tests of the breathing air supply system reportedly used to supply breathing air for operators when connecting / disconnecting phosgene cylinders. Facility management stated that the last 'daily' test of the breathing air system was performed on 8/10/11. **The facility must ensure that tests on the adequacy of the breathing air supply system are performed per schedule, as required by 40 CFR 68.65(d)(2).**

- During an employee interview, an employee explained that operators may not wear breathing air supply apparatus (required when connecting / disconnecting phosgene cylinders) during the Summer months due to high ambient temperatures and discomfort. **The facility must ensure that appropriate PPE, including breathing supply air, is worn at all times as necessary, as required by 40 CFR 68.65(d)(2).**

- The reactors, stills, and receivers used in the phosgenation process are not equipped with pressure relief systems. **The facility must evaluate the potential for over-pressurization in this equipment and compliance with the ASME Pressure Vessel Code to assure appropriate pressure relief is provided, as required by 40 CFR 68.65(d)(2).**

- While all phosgene lines (vapor and liquid) are painted yellow for identification purposes, the lines are not labeled as "phosgene" lines, creating the potential for misidentification of lack of awareness from outside responders. **The facility must improve labeling of phosgene equipment and transfer lines, as required by 40 CFR 68.65(d)(2).**

- A 'stop' is missing on one side of the stored row of phosgene cylinders. **The facility must ensure that both sides on the row of stored phosgene cylinders are properly secure, as required by 40 CFR 68.65(d)(2).**

- Facility management reported that the flex hoses used to transport phosgene from the 1-ton cylinders to fixed transfer piping are visually inspected weekly and changed as necessary. This practice is not noted in the facility MI program. It is also noted that a flex hose failure on a similarly designed phosgene distribution system operated at the DuPont, Belle, WV facility ruptured releasing an estimated 2-lbs. of phosgene and resulting in a worker fatality (incident date 1/23/10). The US Chemical Safety Board conducted an investigation and issued a detailed incident report. Among several findings, the CSB reported that the suitable material of construction for flex hoses in phosgene service is Monel, rather than Teflon-lined stainless steel hoses. **The facility**

must review the DuPont, Belle, WV 1/23/10 CSB investigation report and evaluate compliance with the incident report recommendations, particularly materials of construction and inspection / maintenance procedures. The facility's MI program must be updated accordingly, as required by 40 CFR 68.65(d)(2).

- The format and content of the P&IDs on equipment in the regulated process is non-traditional and inconsistent with industry standards (such as International Society of Automation (ISA)). **The facility must continue and complete the on-going project to develop P&IDs, consistent with industry standards, and representative of equipment used in the regulated processes, as required by 40 CFR 68.65(d)(1)(ii).**

- The description of consequences of deviating from safe upper and lower operating limits appear to focus primarily on product quality, efficiency, and yield, rather than process safety implications. **The facility must ensure that the description of the consequences of deviating from upper and lower operating limits address process safety issues, as required by 40 CFR 68.65(c)(1)(iv).**

- Information on material inventories is incorrect because it still shows chlorine on-site at 6,400-lbs. and PCl3 at 42,000-lbs. Also, the maximum inventory for phosgene is listed at 46,000-lbs. when the registered quantity is 32,000-lbs. **The facility must ensure that documentation regarding maximum inventories of RMP regulated materials is accurate, as required by 40 CFR 68.65(c)(1)(iii).**

- PSI documentation includes a statement signed (dated 6/4/12) by the Plant Manager and President that the facility adheres to RAGAGEP. The evaluation does not include a reference to engineering codes or standards or description of how existing equipment is designed and operated consistent with industry codes and standards. Additionally, emergency shutdown procedures requires the operator to manually close valves at the phosgene container or in the distribution lines. All of the shutoff valves are manual. **The facility must provide documentation to support the certification that equipment adheres to RAGAGEP, as required by 40 CFR 68.65(d)(2). Additionally, the facility must evaluate installation of automatic or remotely operated shutoff valves on the phosgene delivery system.**

- No information was available regarding electrical classification. **The facility must develop electrical classification information for the regulated process areas, as required by 40 CFR 68.65(d)(1)(iii).**

- No information was available regarding ventilation system design (particularly for the phosgene container storage room emergency ventilation system). **The facility must develop ventilation system design information, as required by 40 CFR 68.65(d)(1)(v).**

Process Hazard Analysis (PHA) [*40 CFR 68.67*]

- PHA study documentation did not include information to determine if the PHA team included someone with knowledge in the specific PHA methodology being used. **The facility must ensure that PHA study teams include participation by someone knowledgeable in the specific PHA methodology being used, as required by 40 CFR 68.67(d).**

- Due to a less detailed PHA study node list for the phosgene process, it is possible that not all hazards were properly evaluated. **The facility must ensure that PHA studies consider all hazards associated with handling / processing the regulated material, as required by 40 CFR 68.67(c).**

- The facility / stationary source siting evaluation included in the 2003 and 2008 PHAs is simply a description of the surrounding area and a description of area monitors. There is no analysis of the affects of a regulated material release on surrounding areas or the impact surrounding activities can have on the regulated process, nor consideration of release impact on control room or other areas where employees may congregate. **The facility must ensure that PHA studies adequately consider stationary source siting, as required by 40 CFR 68.67(c)(5).**

- Human factors appears to have been properly evaluated under nodes 4 and 5 of Process 1 (phosgene process), but not for the other nodes. **The facility must ensure that PHA studies adequately consider human factors, as required by 40 CFR 68.67(c)(6).**

Standard Operating Procedures (SOPs) [*40 CFR 68.69*]

- During the facility tour, the Plant Manager explained that the emergency scrubber for Building 4 (phosgene container room) is turned ON during cylinder connection/disconnection; the "Phosgene Handling and Delivery" SOP does not include this step in start-up. **Procedures must be reviewed and corrected to include desired operating status of the scrubber during phosgene handling, as required by 40 CFR 68.69(a)(1).**

- Step 12 (Initial Start-up) in the "Phosgene Handling and Delivery" SOP states that there are two valves in the phosgene line between the cylinder and the flow meter, when in fact there is only one valve. **The phosgene handling procedure must be reviewed and corrected to include proper valve and valve number references, as required by 40 CFR 68.69(a)(1).**

- The only date on the SOPs is on the cover page, which lists April 2012. Annual certification of the procedures is documented by a general statement that the procedures were *" ... reviewed in April 2012 by management of TLC."* **The facility must document that each procedure has been reviewed, updated where necessary, and certified (indicating who performed review/certification), as required by 40 CFR 68.69(c).**

Mechanical Integrity [*40 CFR 68.73*]

- There was no record indicating that the hoist inspection program complies with RAGAGEP, such as ASME/ANSI consensus standard B30.16 for overhead hoists. **The facility must ensure that RAGAGEP inspection and test procedures are being followed, including applicable standards for overhead hoists, as required by 40 CFR 68.73(d)(2).**

- The MI program equipment list includes equipment no longer in service, such as the phosphorus trichloride storage tank and associated piping. Additionally, the phosgene hoist is not included on the list of equipment included in the inspection and test program. **The facility must ensure that the list of equipment and instruments included in the MI program is accurate and up-to-date, as required by 40 CFR 68.73(b).**

- The program states that basis for inspection and test frequency is based on company experience due to the lack of manufacturers' recommendations. In fact, there are existing ASME and ANSI standards applicable to pressure vessels, process piping, relief systems, and pumps. **The facility must document the basis for inspection and test frequencies, as required by 40 CFR 68.73(d)(3).**

- No records available of thickness tests on pressure vessels (i.e. reactors) or phosgene transfer piping (such as non-destructive examination (NDE) wall thickness tests); the MI program does state that process piping will be measured for wall thickness but no records were available for review. **The facility must ensure that integrity testing of pressure vessels and process piping is performed consistent with RAGAGEP, including ASME standards, as required by 40 CFR 68.73(d)(1) and (2).**

- Records of completed inspections and tests include only the date of the inspection/test, but do not include identification of who performed the inspection / test or the results of the inspection / test. **The facility must ensure that documentation of completed inspections / tests include identification of who performed the inspection / test, equipment identifier, description of inspection and test performed, and the results of the inspection / test, as required by 40 CFR 68.73(d)(4).**

- All equipment and instrument inspection and tests are performed internally, with no evaluation performed by outside experts (such as hoist inspection, vessel inspections, pipe inspections). **The facility must ensure that appropriate checks and inspections are performed to assure that equipment was installed properly and consistent with design specifications and manufacturer's instructions, as required by 40 CFR 68.73(f)(2).**

- The MI Program does not include a description of how maintenance materials and spare parts are managed to ensure that they are suitable for intended service. **The**

facility must ensure that maintenance materials and spare parts are managed to ensure that they are suitable for their intended service, as required by 40 CFR 68/73(f)(3).

Management of Change (MOC) [*40 CFR 68.75*] & Pre-Startup Review (PSR) [*40 CFR 68.77*]

- The 2/06 MOC addressed the addition of a second pH controller to the phosgene scrubber; documentation indicated that there was no need to update the P&ID to show this new instrument. The 5/6/05 MOC addressed the addition of a 4" Teflon plug valve to the phosgene reactors; documentation indicated that there was no need to update the P&ID to show this new plug valve. The 10/17/05 MOC addressed modifications to the phosgene cylinder vent location; documentation indicated that there was no need to update the P&ID to show this new vent location. **The facility must ensure that PSI, including P&IDs are updated as necessary to reflect process changes, as required by 40 CFR 68.75(d).**

- The safety and health review of MOCs dated 2/06, 5/6/05, and 10/17/05 indicated that these changes were a 'safety improvement' but did not consider the safety and health implications of the change. **The facility must ensure that MOC reviews include a review of the impact on safety and health of process changes, as required by 40 CFR 68.75(b)(2).**

- There was no pre-startup safety review documentation available related to MOCs dated 2/06, 5/6/05, and 10/17/05. **The facility must ensure that pre-startup safety reviews are completed for all changes requiring a change to PSI, as required by 40 CFR 68.77(a).**

Compliance Audits [*40 CFR 68.79*]

- There is no system to track the status of RMP audit findings, and many of the findings in Twin Lake Chemical's RMP audits did not result in specified corrections. Most of the findings of EPA's RMP inspection were not identified during Twin Lake Chemical's RMP audits. **The facility must conduct complete, comprehensive audits of their RMP program, including a system to track all audit findings to ensure that all findings are addressed, as required by 40 CFR 68.79.**

Employee Participation [*40 CFR 68.83*]

- There was no operator participation during the 2008 PHA revalidation. **The facility must ensure that employees (and their representatives) are consulted on the conduct and development of process hazard analyses, as required by 40 CFR 68.83(b).**

Contractor Safety [*40 CFR 68.87*]

- Contractor procedures include steps for contractor selection based on safety performance and contractor orientation, but does not include procedures for conducting performance evaluations of contractor work while on-site. **The facility must ensure that the contractor procedure includes requirements for performing periodic performance evaluations, as required by 40 CFR 68.87, for all covered contractors.**

- Facility management reported that they do not use contractors to work on RMP-covered equipment, however, their contractor procedure states that contractors only work on equipment when it is shut down. All areas of the facility represent a potential hazard due to the facility's phosgene operations, therefore, contractor safety procedures are required for anyone entering the facility regardless of whether they perform work directly or indirectly on the covered process. There were no contractor records available for review. **The facility must ensure that contractor procedures required by 40 CFR 68.87 are followed for all covered contractors working on or near a covered process.**

Emergency Response [*40 CFR 68.90 – 68.95*]

- Other than dialing 911, the facility does not have a means for immediate community notification in the event of a chemical emergency, and neither the Niagara County LEPC nor Lockport emergency services have a specific communications or response plan for the facility. **The facility must ensure appropriate procedures to inform the local community and emergency services for phosgene releases, as required by 40 CFR 68.95 (a)(1)(i).**

- The facility's response plan does not include specific hazmat response procedures, personal protective equipment, hazard assessment, decontamination, first aid, etc. The emergency response plan does not include a hazmat team members list or defined roles and responsibilities. **The facility must develop and implement a comprehensive emergency response, as required by 40 CFR 68.95 (a)(1)(ii)(iii).**

- Neither the Niagara County LEPC nor Lockport emergency services have a response plan for the facility. **The facility must ensure appropriate community emergency response plan for their facility, as required by 40 CFR 68.95 (c).**

- The facility provided respirator qualitative fit-testing testing records for their employees, however, they do not perform quantitative fit-testing as per regulatory requirements. **The facility must ensure that appropriate personal protective equipment is available for emergency response, as required by 40 CFR 68.95 (a)(2).**

- The facility maintains air-purifying respirators (APRs) with chemical cartridges for use in response chemical emergencies, including phosgene releases, however, NIOSH specifies that only supplied air breathing apparatus (Level B) for phosgene response. In addition, the facility's emergency response chemical protective suits are not rated for phosgene. **The facility must ensure that appropriate personal protective equipment is available for emergency response, as required by 40 CFR 68.95 (a)(2).**

- The facility has one handheld phosgene monitor, however, the monitor was not functional at the time of the inspection and appeared not have been so for some time. There were no calibration or maintenance records for the unit. **The facility must ensure appropriate inspection, testing, and maintenance of their emergency response equipment, as required by 40 CFR 68.95 (a)(2).**

- The facility does not provide initial and/or annual refresher training for their hazmat response team members. **The facility must provide initial and annual refresher training for their emergency response team members, as required by 40 CFR 68.95 (a)(3).**

Recommendations:

There is no emergency egress bottle on the supplied air respirator for operators when connecting / disconnecting phosgene. The facility should ensure that the supplied air respirator is properly configured and supplied with an emergency egress bottle per OSHA regulatory requirements.

The facility does not provide medical monitoring for their hazmat team members.
The facility should ensure proper medical monitoring for their hazmat team members as per OSHA regulatory requirements.

Current RMP registration for the facility lists phosgene, chlorine, and phosphorous trichloride at quantities above the regulated threshold amounts. On-site inventories of chlorine and phosphorous trichloride are in fact less than the regulated thresholds. The facility should revise their RMP registration to list only phosgene which is above the RMP regulatory threshold.

INSPECTOR SIGNATURE: _____
Dwayne Harrington, Inspector Date

APPROVER SIGNATURE: _____
John Higgins, Section Chief Date